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Experimental Studies on the Disturbances of the Liver Function with the Radioactive Phosphorus p^{32}

AUTHOR(S):

Inoue, Katashi; Miyake, Tadashi; Ichida, Fumihiko;
Uchino, Haruto; Kariyone, Shigeo; Fukuda, Minoru;
Hiraide, Sadamu

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32. Experimental Studies on the Disturbances of the Liver Function with the Radioactive Phosphorus P^{32} *

*Katashi Inoue, Tadashi Miyake, Fumihiko Ichida, Haruto Uchino,
Shigeo Kariyone, Minoru Fukuda and Sadamu Hiraide*

(K. Inoue Laboratory)

The radioactive phosphate solution was injected into male rabbits with the artificial bile fistula, and the excretion was determined for five hours after the administration of the radiophosphorus both into the bile, and the urine.

Each rabbit was injected with a single dose of the P^{32} with the activity of $0.025\mu\text{c}$ per 1 gram body weight intravenously. The stock solution of the radiophosphate, in the form of the mixture of Na_2HPO_4 and NaH_2PO_4 with the pH 7.3-7.4, was diluted with the physiological saline solution at the time of the application.

The total amount of the biliary excretion of P^{32} for five hours after the injection was 0.11 per cent of the administration in the control animal, while that in the rabbit with the acute experimental liver damage caused by the peroral administration of 0.2 cc per kilo body weight of chloroform 24 hours before the P^{32} injection ran up to 0.22 per cent. The biliary excretion of P^{32} in both cases progressed in the same manner, namely the bulk was excreted in the first one hour, and then the excretory rate decreased gradually in the liver damaged animal as well as in the normal animal. The intramuscular application of 160 mg methionine had no influence upon the excretion in both cases.

The total amount of the urinary excretion of P^{32} in the control animal and in the liver-damaged animal was 6.5 and 4.9 per cent of the administration respectively. In the former the bulk was excreted in the first one hour, and the excretion decreased thereafter rapidly, while in the latter the excretory rate was relatively low at first, but it remained unchanged for three hours and then decreased gradually.

Each animal was sacrificed five hours after the P^{32} administration, and the specific activities of the acid soluble, lipid, and residual phosphorus fractions of the liver homogenate were determined. The relative specific activity of the lipid fraction of the damaged liver attained to high value, and it was augmented by the methionine treatment.

The radioautographic studies were carried out on the liver specimens of male mice, which had been injected with $7\mu\text{c}$ per 1 gram body weight of the P^{32} subcutaneously, three hours after the injection. The distribution of the activities

* The radioisotopes were distributed from the Atomic Energy Commission of U.S.A.

was uniform in the control liver tissue, while that in the damaged liver lacked the uniformity, namely there were few activities in the vicinities of the central veins, and the remaining part contained much more activities, and then in this remaining part there were more of them in the damaged liver even than in the control liver tissues. The acute experimental liver damage was done by the subcutaneous injection of 0.02 cc per 30 gram body weight of CCl_4 24 hours before the P^{32} administration. The stained specimens of the liver disclosed the toxic necrosis with the nuclear disappearance in the central zones, and in the remaining tissues there was seen parenchymal degeneration with the granulated protoplasm of the liver cells. The same parenchymal degeneration were also found in the control liver cells, therefore we presume that the changes were made by the administration of the large dose of the radiophosphorus.
